

# Research Report



## The life and times of *Ostrinia nubilalis*

*A computer model targets the European corn borer*

**T**he European corn borer (ECB), a pyralid moth, and in its caterpillar stage, the greatest pest known to corn, made its way across the Atlantic in a Boston-bound shipment of broom corn 60 years ago. It drifted across North America, finding its way to Ontario in 1920, and to the prairies in 1949. A small infestation in southeastern Alberta was wiped out in 1956, but a subsequent infestation had spread beyond control by 1980. Since then, the ECB has spread from Medicine Hat to Lethbridge, and stands as a potential threat to virtually every acre of corn in the province. With the aid of a grant from Alberta Agriculture's Farming for the Future program, University of Alberta entomologists Dennis Lee and John R. Spence have been studying the dynamics of ECB populations in hopes of finding a cost-effective way to control them.

One of the most remarkable things about the corn borer is the flexibility of its life cycle. Depending on local climate, an ECB population can squeeze out anywhere from one to four generations a year (the higher the tem-

peratures, the more generations). Mr. Lee and Dr. Spence tracked the ECB through its life cycle – through five larval stages to pupa to moth – and were not surprised to find that ECB populations in southern Alberta produce only one generation annually.

The cycle begins in July with the mother laying eggs on the underside of corn leaves. The eggs hatch, and during the first and second of the five larval stages crawl around from plant to plant. Sometime during the second stage they bore into the plant and begin burrowing around, inflicting damage. Larvae overwinter in the fifth stage and emerge in the spring to feed and pupate. After ten days, the moths appear and the cycle begins again.

Mr. Lee and Dr. Spence's research, performed over a two-year period in the laboratory and in the field, allowed them and Dr. Doug Kelker (Department of Statistics and Applied Probability, University of Alberta) to produce a numerical model which uses daily temperatures to predict when each growth stage will occur. However, Michael G. Dolinski, Section Head of Entomology, Plant

Pathology and Apiculture for Alberta Agriculture, points out, "The computer model needs to be tested over a number of seasons, with practical testing to the extension phase for producers." Mr. Dolinski and Dr. Spence both agree that the ability to make such predictions is valuable because insecticides are only effective against the ECB during the first two of the five larval stages. "We all want to minimize the use of insecticides because of possible harmful effects to the environment," Dr. Spence says. "If the grower can pinpoint when the corn borer is going into these two critical stages, he can spray at the proper time and maximize his kill. He doesn't have to spray over an extended period of time. It allows for more efficient management." ☑

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# Handing over the farm

Researcher studies retirement trends



University of Alberta Professor of Family Studies, Dr. Keating

For the head of an urban family, retirement can be a sudden thing. On the day he turns 65, he picks up his last paycheque, turns in his key, and begins a new life. But for the average farmer, says Norah Keating, a University of Alberta professor of family studies, retirement is gradual and complicated. It usually begins when he hits middle age and his teenage children take more responsibility for the chores. It might not end until the farmer, in his seventies, decides to pack up and move into town.

Dr. Keating, with the help of a grant from Alberta Agriculture's Farming for the Future program, spent much of the last year studying how farmers retire, and how they transfer their operations to the next generation. She

interviewed about 350 farmers from across Alberta, all of them over 50 years of age. "We found that retirement on the farm frequently means a son is taking over," she says. "Farmers are five times more likely than other small businessmen to pass on their businesses to their heirs."

She also learned that retirement usually takes place in three stages. The farmer first gives his heirs responsibility

*"It's like parting with your heritage, you have to remember that a farm is both a home and a business. It's not easy for a farmer to let go of that."*

for the chores, then for production decisions and financial management, and finally ownership. "It's seldom clear cut," she says. "For instance, the farmer will often share the chores, or management responsibilities or ownership with the next generation before handing it over completely."

But a gradual transfer is generally effective, says Dr. Keating, because the children are brought up on the farm and "socialized to a farming lifestyle." By the time they are in control, they know the business well and are able to manage it without great difficulty.

The most troublesome step is often the last one, and it is not unusual for the farmer to withhold title to his land until his will is read. "It's like parting with your heritage," says Dr. Keating. "You have to remember that a farm is both a home and a business. It's not easy for a farmer to let go of that."

In the course of her studies, Dr. Keating discerned a number of trends in farm transfers. For instance, she found a greater number of farm wives are making management

## Sudden death

Why broiler chicks just die

**S**udden death syndrome (SDS) is a widely-studied, yet still inexplicable, affliction of broiler chickens. John R. Hunt, a research scientist at Agriculture Canada's Agassiz, B.C., Research Station, estimates that SDS also accounts for 50% of the deaths in young broiler chicks. "It's very mysterious," he says. "The birds that die of it are fully fleshed, and there is feed in their systems. They exhibit no odd behavior. They simply drop dead. We know of no way to predict which bird will drop next." SDS routinely claims up to 2% of the average producers' broiler stock, making it a very expensive problem.

With the help of a grant from Alberta Agriculture's Farming for the Future program, Dr. Hunt and fellow researchers R.C. Newberry, K.E. Buckley, and Earl Gardiner, sought to learn if any relationship exists between SDS and the fatty acid composition in the hearts and livers of chicks. Fatty acids were targeted as a result of the observation of measured levels of SDS associated with ra-

tions containing different sources of fat. Using birds and feed supplied by B.C.'s Chicken Marketing Board, they employed a number of people to walk through the 12,000-bird barn at Agassiz searching for victims of SDS. Whenever one was found, its heart and liver were removed and frozen in liquid nitrogen for fatty acid analysis. For each victim found, a live and apparently healthy bird was sacri-

*"You learn to be patient. If you get frustrated by this sort of thing, you shouldn't be a research scientist."*

ficed so that its heart and liver could be used as a control.

The research turned up some interesting relationships between fatty acid compositions and the affliction. Abnormal levels of certain fatty acids were found in lipid fractions taken from the hearts and livers of SDS birds. These

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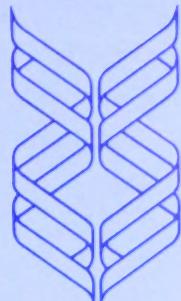
Dr. Hunt and Dr. Newberry at the Agassiz Research Station

decisions. "We found many women making high-level management decisions," she says. "It has never been unusual to find wives keeping the books, but now they are also becoming financial managers. One result of this is that it is becoming more common for a widow to run a farm after her husband's death, either in place of the children or in concert with them." Dr. Keating also found some farmers waiting to see how a son's marriage works out before handing him title to the family spread. "Divorce is more common these days and the courts sometimes order property split between husband and wife when the marriage breaks up," she says. "So a farmer who wants to keep his property in the immediate family might watch his son's marriage with great interest."

Dr. Keating concludes that the smoothest transfers, and the most enjoyable retirements, will occur when the farmer and his wife consult with their heirs when making plans. All too often, she says, a farmer decides what will be done and then breaks the news to his family. "Tensions are less likely when the farmer and his wife sit down with their children and discuss who can best run a certain aspect of the operation, and who actually wants to run it. It could be a terrible surprise for a farmer to learn that his son, John, the heir apparent, wants nothing more than to get off the property."

Dr. Keating is pleased to see the emergence of government programs like Alberta Agriculture's Farm Estate Planning home-study program, aimed at helping farmers through the transition to retirement. "It's something that has never been given much attention," she says, "but it's a crucial step for both generations involved." She hopes her research will help farmers, social policy planners and financial experts make retirement and transfer easier to accomplish. 

# FARMING FOR THE FUTURE



by **Dr. Ralph G. Christian**  
**Executive Director**  
**Research Division**  
**Alberta Agriculture**

**B**y now, many of you will have heard about the Alberta Agricultural Research Institute (AARI). For only the second time, *Research Report* issued a special edition, to announce the creation of AARI. On August 25, 1987, AARI's Board met in the Legislature Building under the leadership of its Chairman, Mr. Bob Bogle, MLA, Milk River, and with the Honourable Peter Elzinga, Minister of Agriculture, in attendance.

The creation of the Institute has necessitated the renaming of the Agricultural Research Council of Alberta (ARCA). Because the name and acronym might prove confusing, and because ARCA's chief responsibility is the administration of the Farming for the Future program, its name has been changed to the

## Farming for the Future Council.

Despite the new name, the Council, and the Farming for the Future program will remain strong and vital. The focus will continue to be on the funding of short-term research and demonstrations. As such, Farming for the Future will complement the work of AARI, which hopes to be able to fund long-term projects. As part of its mandate, the AARI Board of Directors will be developing priorities for agricultural research. The Farming for the Future Council, along with other agencies, will be asked to consider the priorities when making decisions.

This is an exciting time for agricultural research in Alberta. While the stakes have never been higher, the Province's commitment to agricultural research has never been greater. Industry, universities, government and agricultural producers and processors are pulling together toward the goal of a profitable and advanced provincial agri-food industry. 



# Something old! Something new!

## Soil cement for a pit silo floor

**I**t would happen every spring. Lawrence Trenholm, who keeps up to 350 head of cattle on his farm 12 miles west of Didsbury, would drive his tractor up to his silage pad for a load of feed on a rainy day and his wheels would spin. After a couple of trips, the ground at the entrance to the pit would be churned up, mucky, and rutted. After wasting a few afternoons up to his knees in mud trying to free his tractor, he was determined to do something about his problem.

"I remembered the oldtimers talking about how they made soil cement for roadways years ago," says Mr. Trenholm. "I figured I could make a floor for my silage pit the same way." Olds District Agriculturist, Steve Archibald, found him some old pamphlets on how to make soil cement. Alberta Agriculture's Farming for the Future On-Farm Demonstration Program helped the experiment along with a grant.

*"The big advantage for a small operator like me, is that soil cement costs about half as much as poured cement."*

Mr. Trenholm decided to give himself room for expansion. With a rented Caterpillar tractor he dug a pit 34 feet wide, 115 feet long and 10 feet deep. He dug it into the side of a coulee so that he could enter at ground level. He then hauled in a load of pit gravel and laid



**Didsbury farmer Lawrence Trenholm**

down a four-inch base. On top of that he placed six or seven inches of crushed gravel. "Then I took ordinary Portland cement — one bag per 32 square feet — and spread it over the gravel," he says. "We rototilled it three times to mix it up really good. Then we rented a big power vibrator and hammered it for eight hours steady."

The moisture in the pit (from the silt and clay in the crushed gravel) was enough to activate the cement. Mr. Trenholm sprinkled water on the surface while working with the power vibrator to ensure it didn't set too early. "The longer it takes cement to dry and cure," he says, "the stronger it sets." That done, he simply poured in his silage.

"The big advantage for a small operator like me," says Mr. Trenholm, "is that soil



**The soil cement silo pit**

cement costs about half as much as poured cement. The big feedlots use the poured stuff, but I can't afford it," Steve Archibald, agrees. "It has the potential to be an economic way to get a reasonable base for a pit silo." In the two years since he constructed the pit, Mr. Trenholm has experienced no breaking, cracking or chipping. "It's just like driving up onto a shop floor," he says. "The whole experiment turned out to be very satisfactory."

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abnormal levels suggest that SDS might be linked to interruptions in the synthesis and supply of the hormone prostaglandin, which regulates tissue functions, such as the beating of the heart.

While Dr. Hunt is anxious to pursue this new avenue of research, he does not expect to solve the mystery of SDS overnight. One obstacle he faces is that scientists have yet to figure out how to induce the syndrome. Re-

searchers have played with diets and environmental conditions in chicken barns, but to no effect. If they could find a way to cause SDS in, say, 50% of a population, they could monitor with much greater accuracy changes in individual birds before, during and after death.

"Right now," says Dr. Hunt, "we are left to study birds which are already dead, and many changes occur in a bird upon death. That com-

plicates our research." He estimates it will be five to seven years before scientists have the answers they need to combat the syndrome. He admits it's a long time and a difficult task, but remains undaunted. "You learn to be patient," he says. "If you get frustrated by this sort of thing, you shouldn't be a research scientist."